MISR and AirMISR at CLAMS

	AirMISR	MISR
Platform	ER2 Aircraft	Terra Satellite
Elevation	20 km	704 km
Angular Coverage	{±70.5, ±60˚, ±45.6˚, ±26.1˚, nadir}	same
Spectral Channels	{446, 558, 672, 867 nm}	same
Pixel Resolution	27.5 m	275 m
9-Angle Coverage	11 x 9 km Patch	360-km Swath
Observing Method	1 Pivoting Camera	9 Cameras

AirMISR acquires 9 images over the range of angles in a **12-min**, **147-km** ER-2 flight line.

MISR acquires 9 images of a 360-km swath over a period of **7 minutes**, about **once per week** at COVE.

MISR Team Goals for Participation in the CLAMS Summer 2001 IFC

1. **MISR Retrieval Validation** -- to test our multi-angle aerosol retrieval approaches over dark water, at least using AirMISR observations, but we hope also with MISR observations.

To meet this goal, we need as close to a "**column closure**" experiment as possible. The aim is to characterize at least one column in as much detail as possible -- aerosol properties, vertical distribution, radiation field, boundary conditions -- coincident with AirMISR (and possibly MISR) overflight, under cloud-free conditions.

We anticipate testing our sensitivity to **maritime aerosol** air masses, possibly **clean continental** or **industrially polluted** aerosol air masses, and **thin cirrus** at COVE.

The collection of aircraft and surface instruments involved makes this a unique opportunity to meet one of our key validation goals.

2. **Scene Variability** -- to quantitatively assess the contribution of sub-MISR-pixel scene variability to aerosol measurement uncertainty over dark water.

To meet this goal, we need a "**Volume Closure**" experiment, with **both MISR and AirMISR** observing the region under cloud-free conditions. At the same time, the aggregate of surface and aircraft platforms have to do the best job they can characterizing the spatial variability of the surface BRDF and atmospheric gas and aerosols, on one-to-ten-kilometer scales.

Since there is **only about a 1 in 3 chance of cloud-free conditions** for a MISR overpass during the Summer 2001 IFC, it is less likely we will meet this goal. We may reassess our options for meeting this goal next year.

Projected MISR coverage for the CLAMS period, July 10- August 1, 2001

Date	UTC	Target	Orbit	Path
July 10 2001	191_16:06	Chesapeake	8305	14
July 17 2001	198_16:12	Chesapeake	8407	15
July 19 2001	200_16:00	Chesapeake	8436	13
July 26 2001	207_16:06	Chesapeake	8538	14
Aug 2 2001	214_16:12	Chesapeake	8640	15
Aug 4 2001	216_16:00	Chesapeake	8669	13

...of which, Path 15 is less good than 13 and 14.

Volume Closure Experiment

Purpose

- **Column closure** -- find "**representative values**" for optical and radiation quantities in a column of atmosphere-surface.

- **Volume closure** -- characterize **both mean values and variability** in a volume of atmosphere and underlying surface

-- For MISR, **scene variability contributes significantly** to measurement uncertainty, even for fairly "uniform," dark-water scenes, at least in some cases

-- Radiometric calibration uncertainty contributes less than for previous instruments

-- Relevant length scales: 0.25 km to 20 km

-- Also needed to **make connections** between MISR, AirMISR, and surface measurements

Volume Closure Experiment for ACE-Asia

Experiment Plan

EXPERIMENT 1. **Temporal Correlation Scales**; time-of-day and meteorological dependences

- High frequency data over extended periods at fixed surface locations
- Optical depth (sunphotometer), Vertical Structure (lidar), others.

EXPERIMENT 2. **Spatial Coherence Length**(s); and Discontinuities

- Aerosol data at one location, then move ship upwind (or cross-wind) and repeat

EXPERIMENT 3. **Control for Space and Time Independently**

- One ground station as well as the ship taking data in close proximity

EXPERIMENT 4. **Characterize aerosol and surface variability** in a volume

- Deploy one or two aircraft, relative to one or two surface stations, to do the best job possible
- Only Experiment 4 involves aircraft.